We claim:

1. A molecular rotary motor comprising:

a first two dimensional array of a first motor protein;

a second two dimensional array of a second motor protein that interacts with the first motor protein to move directionally relatively to the first array; and

wherein the first and second arrays of motor proteins are in sufficiently close contact to interact and move the second array relative to the first array.

2. The molecular motor of claim 1, further comprising a driven member moved by the directional movement of the second array.

3. The molecular motor of claim 1, further comprising multiple nested first and second arrays that interact with one another to directionally move the first and second arrays relative to one another.

4. The molecular motor of claim 1, wherein each two dimensional array is a curved surface.

5. The molecular motor of claim 4, wherein each curved surface is a continuous curved surface.

6. The molecular motor of claim 5, wherein each curved surface is a complementary shaped cylindrical or conical surface.

7. The molecular motor of claim 6, comprising a plurality of nested cylindrical or conical members, the surfaces thereof forming the complementary curved surfaces.

8. The molecular motor of claim 1, wherein the first motor protein is actin and the second motor protein is myosin.

9. The molecular motor of claim 1, further comprising a source of ATP.

10. The molecular motor of claim 1, further comprising perforations in surfaces on which the arrays are disposed, to allow permeation of an ATP containing liquid through the surfaces to the motor proteins.

11. The molecular motor of claim 1, wherein the first array is coated on a first curved surface, and the second array is coated on a second curved surface.

12. The molecular motor of claim 10, wherein one of the arrays is coated on an outer surface of a cylinder, shaft or cone, and another of the arrays is coated on an inner surface of a surrounding structure having a complementary shape that substantially conforms to a shape of the outer surface of the cylinder, shaft or cone.

13. The molecular motor of claim 1, wherein directional movement of the second array moves a driver.

14. The molecular motor of claim 13, wherein the driver is an internal shaft or cylinder in the motor.

15. The molecular motor of claim 13, wherein the driver is an outer curved surface of the motor.

16. The molecular motor of claim 2, wherein the driven member is a rotating shaft, a propeller, a wheel, a lever-arm, a gear system, or a pulley system.

17. The molecular motor of claim 1, wherein the arrays are of a preselected dimension that provides a preselected power output of the motor.

18. The molecular motor of claim 17, wherein the preselected dimension is a length of the array.

19. The molecular motor of claim 3, wherein a preselected number of multiple nested arrays are provided to select a speed of rotation of the motor.

20. A molecular rotary motor, comprising:

a curved continuous first surface to which is attached a circumferential coating of a first motor protein;

a complementary continuous curved second surface to which is attached a circumferential coating of a second motor protein that interacts with the first motor protein to move the second surface relative to the first surface.

21. The molecular motor of claim 20, wherein the continuous curved surface is a closed surface of rotation having an internal radius.

22. The molecular motor of claim 21, wherein the closed surface of rotation is a cylindrical or conical surface.

23. The molecular motor of claim 20, wherein the first motor protein is actin and the second motor protein is myosin.

24. A molecular motor comprising:

a series of concentric tubes or hollow cones, wherein each of the tubes or hollow cones has an outer surface and an inner surface;

a first motor protein attached in a continuous ring around the outer surface of each of the tubes or cones;

a second motor protein attached in a continuous complementary ring around the inner surface of each of the tubes or cones;

wherein one of the motor proteins is applied directionally to the surfaces, and the inner and outer surfaces are in sufficiently close contact that the first and second motor proteins interact to move the first and second motor proteins, and the outer and inner surface, relative to one another.

25. The molecular motor of claim 24, wherein the first motor protein is actin, which is applied directionally around the outer surface of each of the tubes or cones, and the second motor protein is myosin, which interacts with the actin to move the inner surfaces relative to the outer surfaces.

26. The molecular motor of claim 25, wherein the outer surface includes nickel, and the actin is anchored to the outer surface by a histidine tag which binds to the nickel in the outer surface.

27. The molecular motor of claim 24, wherein the first motor protein is present on the outer surface in an array that extends both longitudinally along and circumferentially around the tube or cone.

28. The molecular motor of claim 24, further comprising a driver rotated by movement of the first and second motor proteins relative to one another.

29. The molecular motor of claim 28, wherein the driver is driven by a rotating inner tube or cone of the motor.

30. The molecular motor of claim 28, wherein the driver is driven by a rotating outermost tube or cone.

31. A molecular motor comprising:

an inner cylinder or tube, having a coating of actin directionally adhered to an outer surface of the cylinder;

a tubular member around the inner cylinder, the tubular member having a coating of myosin adhered to an inner surface of the tubular member, with the actin and myosin interacting to move the outer surface relative to the inner surface.

32. A method of making a molecular motor, comprising:

providing a first continuous curved surface which rotates around a longitudinal axis;

providing a second curved surface which rotates around the longitudinal axis, and is complementary in shape to the first surface;

adhering a first motor protein to the first surface, and adhering a second motor protein to the second surface, wherein the first and second motor proteins interact to move the first and second surfaces relative to one another.

33. The method of claim 32, wherein one of the motor proteins is actin and another of the motor proteins is myosin.

34. The method of claim 33, wherein the actin is adhered to the surface with a tag that interacts with a component of the surface.

35. The method of claim 34, wherein the actin is recombinant actin expressed with the tag.

36. The method of claim 34, wherein the tag comprises histidine, an S-tag, or streptavidin.

37. The method of claim 33, wherein the actin is directionally applied to one of the curved surfaces by rotating the curved surface in an actin containing solution.

38. The method of claim 32, further comprising:

supplying a fuel source to the first and second motor proteins to activate movement of the first and second surfaces relative to one another.

39. The method of claim 38, wherein the fuel source is ATP.

40. The molecular motor of claim 1, further comprising:

a supply of a fuel source, wherein the supply of the fuel source is used to activate movement of the second array relative to the first array.

41. The molecular motor of claim 40, wherein the supply of the fuel source is a regulated supply of the fuel source.

42. The molecular motor of claim 41, wherein the regulated supply of the fuel source is regulated by a switch or a valve.

43. The molecular motor of claim 40, wherein the fuel source is ATP.

44. A molecular motor comprising:

a first two dimensional array of a first motor protein; and

a second two dimensional array of a second motor protein that interacts with the first motor protein to move directionally relatively to the first array;

wherein the first and second arrays of motor proteins are in sufficiently close contact to interact and move the second array relative to the first array; and

at least one of the first or second array of motor protein is applied directionally on a surface on which the array is disposed.

45. The molecular motor of claim 44, wherein the first motor protein is myosin and the second motor protein is actin and the actin is applied directionally to the surface.

46. The molecular motor of claim 20, wherein the curved continuous first surface has a longitudinal axis and the complementary continuous curved second surface rotates around the longitudinal axis.

47. The molecular motor of claim 46, further comprising a driver rotated around the longitudinal axis by movement of the second surface.

48. A molecular motor comprising:

first two dimensional arrays of a first motor protein; and

second two dimensional arrays of a second motor protein that interact with the first motor protein to move directionally relatively to the first array;

wherein the first and second arrays of motor proteins are in sufficiently close contact to interact and move the second array relative to the first array and

there are multiple nested first and second arrays that interact with one another to directionally move the first and second arrays relative to one another.

49. The molecular motor of claim 48, wherein each two dimensional array is a curved surface.

50. The molecular motor of claim 49, wherein each curved surface is a continuous curved surface.

51. The molecular motor of claim 50, wherein each curved surface is a complementary shaped cylindrical or conical surface.

52. The molecular motor of claim 48, comprising a plurality of nested cylindrical or conical members that are coated with the first two dimensional array of the first motor protein or the second two dimensional array of the second motor protein.

53. The molecular motor of claim 48, wherein the first motor protein is myosin and the second motor protein is actin and the actin is applied directionally to the surface.

54. A molecular motor comprising:

a first two dimensional array of a first motor protein;

a second two dimensional array of a second motor protein that interacts with the first motor protein to move directionally relatively to the first array; and

at least one perforation in at least one surface on which at least one of the arrays are disposed, to allow permeation of an ATP containing liquid through the surface to the motor proteins;

wherein the first and second arrays of motor proteins are in sufficiently close contact to interact and move the second array relative to the first array.

55. The molecular motor of claim 54, wherein the first motor protein is myosin and the second motor protein is actin and the actin is applied directionally to the surface.

56. The molecular motor of claim 1, wherein the first motor protein is myosin and the second motor protein is actin and the actin is applied directionally to the surface.

57. The molecular motor of claim 20, wherein the first motor protein is myosin and the second motor protein is actin and the actin is applied directionally to the surface.

58. A molecular motor comprising:

an inner cylinder or tube, having a coating of myosin adhered to an outer surface of the cylinder;

a tubular member around the inner cylinder, the tubular member having a coating of actin directionally adhered to an inner surface of the tubular member, with the actin and myosin interacting to move the inner surface relative to the outer surface.

59. The molecular motor of claim 1, wherein the first array is coated on a planar surface of a first annular substrate and the second array is coated on a planar surface of a second annular substrate.

60. The molecular motor of claim 59, wherein the coated planar surface of the first annular substrate is adjacent to the coated planar surface of the second annular substrate.

61. The molecular motor of claim 59, further comprising a driver coupled to the second annular substrate and wherein directional movement of the second array moves the driver.

62. The molecular motor of claim 44, wherein the surface comprises at least one planar surface of an annular substrate.

63. The molecular motor of claim 54, wherein the surface comprises at least one planar surface of an annular substrate.

64. A molecular motor comprising:

at least one first annular substrate defining at least one planar surface coated with a first motor protein; and

at least one second annular substrate defining at least one planar surface coated with a second motor protein that interacts with the first motor protein to move the second annular substrate relative to the first annular substrate.

65. The molecular motor of claim 64, wherein the coated planar surface of the first annular substrate is adjacent to the coated planar surface of the second annular substrate.

66. The molecular motor of claim 64, further comprising a driver coupled to the second annular substrate and wherein directional movement of the second annular substrate moves the driver.

67. The molecular motor of claim 64, wherein the first motor protein comprises myosin and the second motor protein comprises actin.

68. The molecular motor of claim 67, wherein the actin is applied directionally around the surface of the second annular substrate.

69. The molecular motor of claim 64, wherein the first annular substrate and the second annular substrate each comprise a disc.

70. The molecular motor of claim 64, wherein the first annular substrate and the second annular substrate each comprise at least two concentric rings.

71. A molecular motor comprising:

a stationary substrate defining a first planar surface coated with a first motor protein;

a terminal annular substrate defining a first planar surface coated with a second motor protein; and

at least one intermediate annular substrate interposed between the stationary substrate and the terminal annular substrate, the intermediate annular substrate defining a first planar surface coated with the second motor protein and an obverse second surface coated with the first motor protein;

wherein the stationary substrate, terminal annular substrate, and intermediate annular substrate are arranged such that each substrate surface coated with the first motor protein is adjacent to a substrate surface coated with the second motor protein.

72. The molecular motor of claim 71, wherein the first motor protein comprises myosin and the second motor protein comprises actin, which can interact

with the myosin to move the intermediate annular substrate and the terminal annular substrate.

73. The molecular motor of claim 71, wherein the intermediate annular substrate and the terminal annular substrate each comprise at least two concentric rings.

74. A molecular motor comprising:

at least one first disc defining at least one surface coated with a first motor protein;

at least one second disc defining at least one surface coated with a second motor protein;

a stationary member affixed to the first disc; and

a rotatable member affixed to the second disc;

wherein the first motor protein can interact with the second motor protein to move the second disc relative to the first disc and consequently rotate the rotatable member.

75. A molecular motor comprising:

a first layer of a plurality of concentric first rings, each first ring defining a planar surface coated with a first motor protein; and

a second layer of a plurality of concentric second rings, each second ring defining a planar surface coated with a second motor protein that interacts with the first motor protein to move the second rings relative to the first rings.

76. The molecular motor of claim 75, wherein the concentric first rings and the concentric second rings are rotatable about a longitudinal axis, and the first layer is axially adjacent to the second layer along the longitudinal axis.

77. The molecular motor according to claim 76, further comprising a first gap between each adjacent first ring of the first layer and a second gap between each adjacent second ring of the second layer, wherein the first layer and the second layer are arranged relative to each other such that each first gap is radially offset from each second gap.

78. The molecular motor according to claim 74, further comprising at least one additional layer of a plurality of concentric third rings, each third ring defining a first planar surface coated with the first motor protein and a second planar surface coated with the second motor protein, wherein the first layer, second layer, and additional layer are arranged such that each planar substrate surface coated with the first motor protein is adjacent to a planar substrate surface coated with the second motor protein.

79. A molecular motor comprising:

at least one continuous loop of a flexible substrate that defines at least a first turning radius and a second turning radius, and at least one surface coated with a first motor protein; and

at least a first rotation locus member disposed at the first turning radius of the continuous loop and a second rotation locus member disposed at the second turning radius of the continuous loop;

wherein at least one of the first rotation locus member and second rotation locus member defines a surface coated with a second motor protein that interacts with the first motor protein to move the flexible substrate relative to at least one of the first rotation locus member or second rotation locus member.

80. The molecular motor of claim 1, wherein at least one of the arrays is coated on a continuous loop of a flexible substrate.

81. The molecular motor of claim 80, wherein the continuous loop moves along an elongated cylindrical, oblong, elliptical, or serpentine path.

82. A method of making a molecular motor, comprising:

providing a first annular substrate defining a planar surface;

providing a second annular substrate defining a planar surface;

adhering a first motor protein to the planar surface of the first annular substrate;

adhering a second motor protein to the planar surface of the second annular substrate; and

positioning the first annular substrate relative to the second annular substrate so that the first motor protein can interact with the second motor protein to move the first annular substrate relative to the second annular substrate.

5